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A NEW SPECIES OF BITING MIDGE OF THE GENUS *ALLUAUDOMYIA* KIEFFER (DIPTERA: CERATOPOGONIDAE) FROM THE SOUTHEASTERN UNITED STATES[1]

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Abstract.—*Alluaudomyia* ***variegata***, a new species of biting midge from the southeastern United States, is described and illustrated, and the known biology is discussed. This species is believed to be a member of the Maculipennis Group and is most closely related to the widespread Nearctic species *A. needhami* Thomsen.

The worldwide genus *Alluaudomyia* Kieffer is comprised of relatively small, often strikingly marked biting midges. Only eight species have thus far been reported for the Nearctic Region (Wirth, 1952a; Williams, 1956). During a study of the Ceratopogonidae of Alabama, males and females of a previously undescribed species of *Alluaudomyia* were taken in light traps at localities in central and northern Alabama. Additional specimens obtained from the National Museum of Natural History, Smithsonian Institution, Washington, D.C., extend the known distribution of this species to encompass the Gulf Coast states of the United States.

For an explanation of the general morphology and terminology of the ceratopogonids see Wirth (1952b). The descriptions are based on specimens slide-mounted in balsam or Hoyer's medium; measurements were obtained with the aid of a calibrated ocular micrometer in the eyepiece of a Zeiss phase-contrast microscope. The wing length is measured from the basal

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arculus to the wing tip; costal length (costal ratio) is obtained by dividing the length of the costa by the wing length. Antennal ratio is determined by the combined lengths of the 5 distal flagellomeres divided by the combined lengths of the preceding 8 flagellomeres. The hindtarsal ratio is obtained by dividing the length of the hindbasitarsus by the length of the second tarsomere. Proportions given for antennal flagellomeres and for palpal segments refer to the relative lengths as units in an ocular micrometer and not as absolute measurements. Variation is given by the mean, followed by the minimum-maximum values and sample size.

All types and other material examined are slide-mounted except where noted. Types are deposited in the National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); paratypes will be deposited in the British Museum (Natural History), London (BM); California Academy of Sciences, San Francisco (CAS); Florida State Collection of Arthropods, Gainesville (FSCA); and the Auburn University Entomological Museum (AU). All other material examined is deposited in the National Museum of Natural History, Washington, D.C.

Alluaudomyia variegata Glick and Mullen, New Species

Figs. 1, 2

Alluaudomyia needhami Thomsen; Snow et al., 1957: 21 (in part, misidentification; reared ♂).

Diagnosis.—A small brownish species; wing markings extensive with dark streaks distally on the veins, membrane between the veins with a varying amount of infuscation. Female with 1 large, ovoid spermatheca. Male 9th tergum with long, slender apicolateral processes; aedeagus with stout, blunt tip; distal portion of paramere laterally recurved terminating in a ventrally bent, pointed apex.

Female.—Wing length 1.26 (0.98–1.52) mm (n = 15).

Head: Brown; occiput white with a midbasal brownish triangulate spot. Eyes medially contiguous for a short distance, bare. Antenna (Fig. 1a) with flagellomeres in proportion of 9-6-6-7-7-8-8-8-10-10-12-11-14; antennal ratio 0.94 (0.87–1.01, n = 14); proximal flagellomeres relatively short and somewhat tapering distally; distal flagellomeres slender; apices of flagellomeres 3–10 pale. Palpal segments (Fig. 1c) short, in proportion of 5-7-8-5-8; segment 3 with a small, round, distal sensory pit with several elongate hyaline sensilla; 1st, 2nd, and base of 3rd segments pale. Mandible (Fig. 1j) with 18 (17–19, n = 10) teeth on inner margin, outer margin with 3–5 widely spaced minute teeth.

Thorax: Brown; mesonotum with numerous, small, dark brown spots; humeri and lateral margins of mesonotum whitish; prescutellum with a median pair of whitish spots and 2 long median setae; scutellum white with a

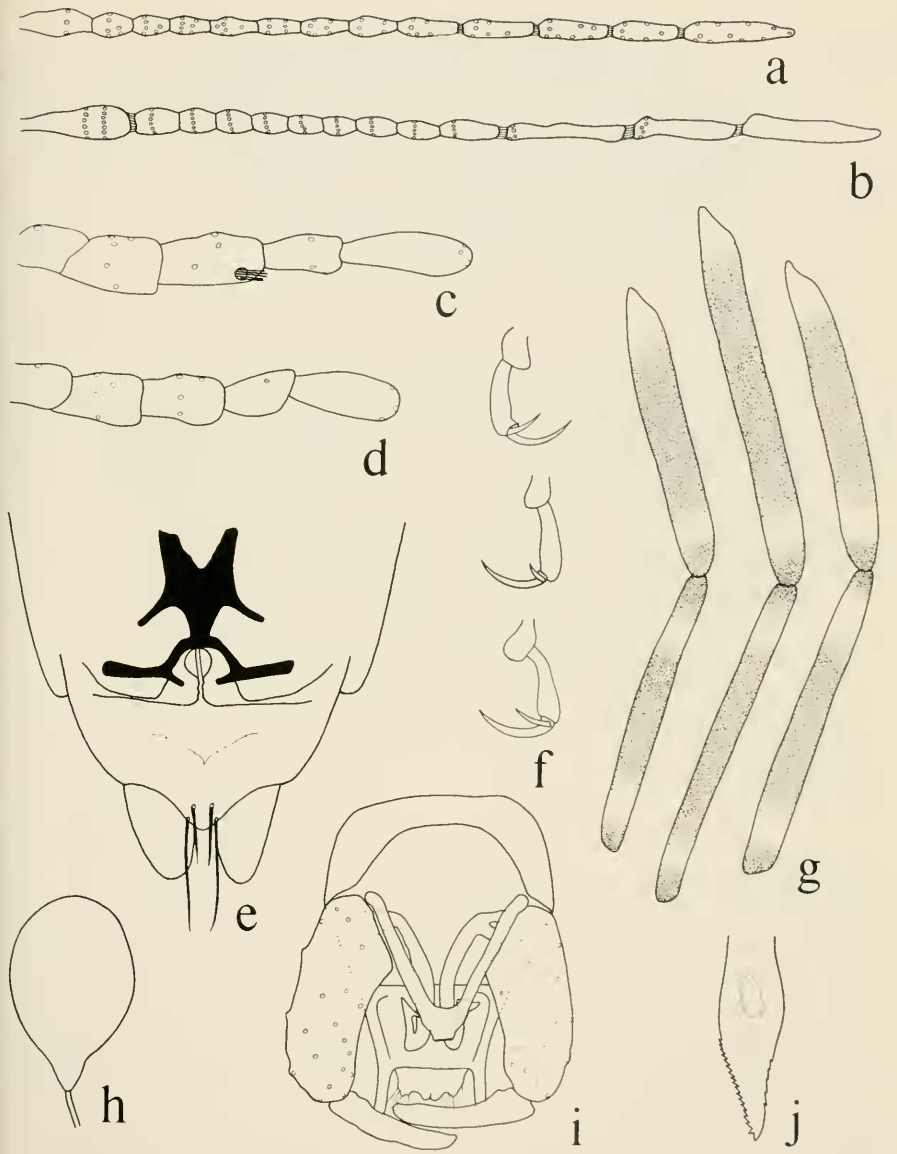

Fig. 1. *Alluaudomyia variegata*. a, c, e–h, j, Female. b, d, i, Male. a, b, Antenna. c, d, Palpus. e, Genital sclerotization. f, Fifth tarsomeres and claws of (top to bottom) fore-, mid-, and hindlegs. g, Femora and tibiae of (left to right) fore-, mid-, and hindlegs. h, Spermatheca. i, Genitalia. j, Mandible.

thin median brown band and with 6 long setae; postscutellum and pleuron brown.

Legs (Fig. 1g): Brown, femora pale basally, with subapical pale rings; tibiae with subbasal and subapical pale rings, broader on hindtibia; tarsi pale, darker at apices, hindbasitarsus brownish; hindtibial comb with 6–7 spines; hindtarsal ratio 2.9 (2.7–3.3, $n = 14$). Tarsal claw (Fig. 1f) long and slender, unequal on all legs.

Wing (Figs. 2a, b): With 6 conspicuous dark spots as follows: 1 large irregular marking proximal to r-m crossvein; a smaller spot just caudad of latter spot; 1 large spot just below apex of radial cell; 1 large elongate spot near base of vein M2; a moderately small spot on anterior wing margin just distad of junction of costa and R1; and a small spot at tip of anal vein. Wing with prominent dark streaks over apices of veins R1 and Rs, midportion and apex of M1, apices of M2 and M3+4, middle of cubitus, and over mediocubital fork to apex of Cu1; small amount of infuscation just distad of basal arculus between bases of radius and cubitus, and on anterior wing margin in costal cell; a varying amount of dark infuscation on the membrane between the veins in distal portion of cells R5 and M2, and extensively in M1, M4, and anal cells (often weakly infuscated in larger individuals, Fig. 2b); costa extending to 0.73 (0.68–0.77, $n = 15$) of wing length. Halter stem and base of knob whitish, dark apically.

Abdomen: Brown; apices of terga with white bands, 7th and 8th terga almost entirely whitish. Genital sclerotization (Fig. 1e) as figured. One large ovoid spermatheca (Fig. 1h) 0.116 × 0.075 mm, with short, tapering, sclerotized neck.

Male.—Similar to female with the usual sexual differences. Antenna (Fig. 1b) with apex of flagellomere 12 and all of 13–15 brownish; scutellum with 4 long setae; dark streaks on wing veins more prominent and extensive than in female, with spot absent on anterior margin of wing distad of junction of costa and R1. Genitalia (Fig. 1i) with sternum 9 relatively short, with a broad, deep, caudomedian emargination, caudal membrane spiculate; tergum 9 elongate with moderately tapering sides and long, slender apicolateral processes. Basistyle moderately long, dististyle nearly straight with stout, blunt apex. Aedeagus heavily sclerotized, with a deep basal arch; basal arms slender and nearly straight, with a small flange at base; distomedian process short and stout with blunt, ventrally bent tip. Paramere with short basal arm and a short, anterolaterally directed basal lobe; stem moderately slender with a slight bend mesally, expanded distally and laterally recurved into a short, slender appendage terminating in a ventrally bent, pointed apex.

Distribution.—Southeastern United States, from extreme eastern Texas to Florida, and north to Tennessee.

Types.—Holotype ♂, allotype ♀, Alabama: Lee Co., Chewacla State

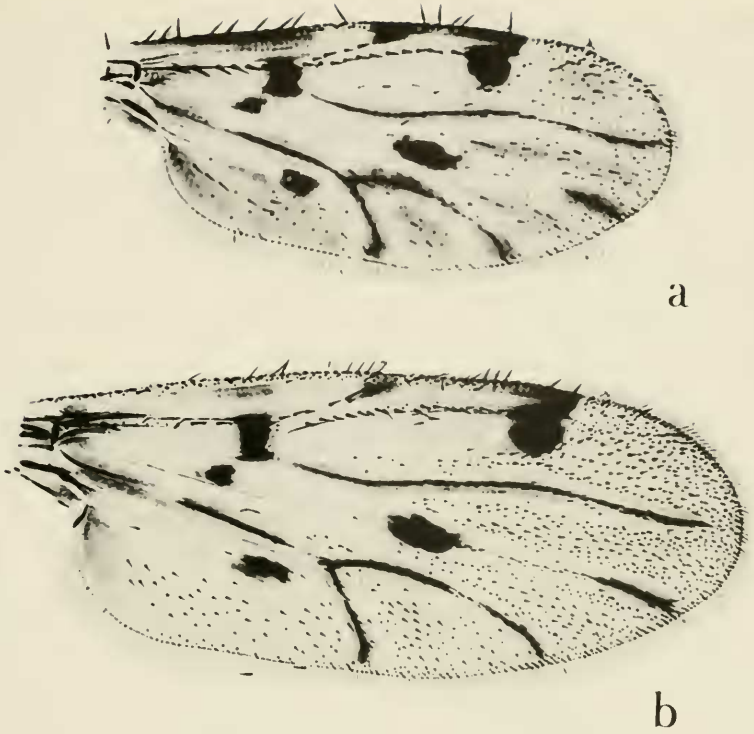

Fig. 2. *Alluaudomyia variegata*. a, b, Female wing, showing range of infuscation on the membrane between the veins.

Park, near Chewacla Pond, J. I. Glick, light trap, 10–11 June 1977 (USNM type no. 76104). Paratypes, 35 ♂, 25 ♀, as follows. ALABAMA: Dallas Co., Marion Junction, Alabama Agricultural Experiment Station (Black Belt Substation), J. I. Glick, light trap, 21–23 May 1978, 1 ♂ (AU); same data, 26–27 May 1978, 1 ♀ (CAS); same data, 31 May–2 June 1978, 1 ♀ (AU); same data, 9–12 June 1978, 1 ♀ (AU); same data, 22–24 June 1978, 1 ♂ (USNM); same locality, M. Lame, reared, 2 May 1979, 1 ♂ (AU); Lauderdale Co., Florence, Collier Slough, near Tennessee River, J. I. Glick, light trap, 21–24 July 1978, 1 ♂ (AU); Lee Co., Chewacla State Park, near Chewacla Pond, J. I. Glick, light trap, 18–19 April 1977, 2 ♀ (AU); same data, 11–17 May 1977, 1 ♀ (AU); same data, 2–8 June 1977, 4 ♂, 5 ♀ (4 ♂, 4 ♀ in alcohol) (AU); same data, 9 June 1977, 2 ♂, 2 ♀ (FSCA); same data, 14 June 1977, 1 ♀ (AU); same data, 22 June 1977, 2 ♂ (AU); same data, 29 June 1977, 1 ♂ (AU); same data, 4 Aug 1977, 1 ♂ (AU); same data, 25 Aug 1977, 1 ♂ (AU), 1 ♀ (USNM); same data, 18–23 July 1978, 1 ♀ (USNM);

same data, 21 Aug 1978, 1 ♂, 1 ♀ (BM); same data, 26 Sept–1 Oct 1978, 4 ♂ (AU); same data, 10–15 Oct 1978, 1 ♂ (CAS); same data, 24–29 Oct 1978, 9 ♂, 2 ♀ (AU), 2 ♂ (USNM); same data, 30–31 Oct 1978, 1 ♂ (AU); same data, 1–6 Nov 1978, 1 ♂ (AU); Loachapoka, Loachapoka Hunt Club, J. I. Glick and B. Buxton, light trap, 27–29 May 1977, 1 ♀ (AU); Morgan Co., Decatur, Wheeler National Wildlife Refuge, J. I. Glick, light trap, 8–10 May 1978, 1 ♀ (USNM); same data, 11–14 May 1978, 1 ♀ (AU); same data, 19–21 May 1978, 1 ♀ (AU); same data, 22–25 May 1978, 1 ♂, 1 ♀ (USNM); same data, 26–29 May 1978, 1 ♀ (AU).

Other specimens examined.—42 ♂, 6 ♀ (USNM) as follows. FLORIDA: Alachua Co., Gainesville, W. W. Smith, light trap, 10 April 1965, 1 ♂; same locality, W. W. Wirth, light trap, 20 April 1967, 1 ♂; same locality, F. S. Blanton, light trap, 8 May 1967, 1 ♂; Hawthorne, F. S. Blanton, light trap, 27 April 1968, 1 ♀; Baker Co., Glen St. Mary, F. S. Blanton, light trap, May 1971, 1 ♀; Gulf Co., Wewahitchka, State Board of Health, light trap, May 1961, 1 ♂; same data, July 1961, 1 ♂; same data, Aug 1961, 1 ♂; same data, Oct 1961, 1 ♂; Holmes Co., Bonifant, State Board of Health, light trap, June 1961, 1 ♂; same data, Sept 1961, 1 ♀; same data, Oct 1961, 1 ♂; Jackson Co., Florida Caverns State Park, W. W. Wirth, light trap, 26 May 1973, 1 ♀; Sneads, State Board of Health, light trap, 6 April 1954, 1 ♂; same data, March 1955, 1 ♂; same data, 31 May 1955, 1 ♂; Jefferson Co., Monticello, W. H. Whitcomb, light trap, May 1969, 1 ♂, 1 ♀; Leon Co., 3 mi N. of Tallahassee, F. S. Blanton, light trap, May 1970, 1 ♀; Liberty Co., Torreya State Park, F. S. Blanton, light trap, 27 April 1958, 1 ♂; same data, May 1971, 1 ♂; same locality, H. V. Weems Jr., light trap, 20 May 1966, 2 ♂; same locality, W. W. Wirth, light trap, 22 April 1967, 1 ♂. LOUISIANA: St. Tammany Parrish, Pearl River, K. T. Khalaf, light trap, April 1966, 16 ♂; Slidell, K. T. Khalaf, light trap, July 1966, 1 ♂. MISSISSIPPI: Hancock Co., Gainesville, K. T. Khalaf, light trap, April 1966, 1 ♂; Harrison Co., K. T. Khalaf, light trap, May 1966, 4 ♂. TENNESSEE: Polk Co., Copperhill, Ocoee Reservoir, E. Pickard and W. Snow, reared from pupa, 26 Aug 1954, 1 ♂. TEXAS: Jasper Co., Jasper, R. E. Woodruff, light trap, 2 Aug 1968, 1 ♂.

Biology.—Snow et al. (1957) reported rearing a single pupa of *A. variegata* to the adult (misidentified by Wirth as *Alluaudomyia needhami* Thomsen). The pupa was collected in late August from a small pool on an island in Ocoee Reservoir, Copperhill, Tennessee; the pool was overgrown with prickly stem smartweed (*Polygonum sagittatum* Linnaeus) and black willow (*Salix nigra* Marsh). During the current study, an adult male was reared in early May from a substrate sample of wet mud and decomposing leaves taken from the margin of a small pasture pond at the Alabama Agricultural Experiment Station (Black Belt Substation), Marion Junction, Alabama. Other Nearctic species of *Alluaudomyia* including *A. bella* (Coquillett), *A.*

needhami, and *A. paraspina* Wirth share a similar larval habitat (Thomsen, 1937; Williams, 1953; Grogan and Messersmith, 1976).

Adults of *A. variegata* have been collected in light traps from March through November, with the greatest numbers being taken during April and May. In east-central Alabama two activity peaks were noted, the first from May through June and a second in October.

Discussion.—Wirth and Delfinado (1964) proposed five "natural" groups for the genus *Alluaudomyia* in which they placed 79 of the 99 then known species. We are placing *A. variegata* in the large and diverse Maculipennis Group, the adults of which are characterized by the following combination of group characters: (1) wing with at least two conspicuous spots, one proximal to the r-m crossvein and one at the apex of the costa; (2) the distal portions of the wing veins often with dark streaks, and often with prominent spots present in the cells between the veins near the wing margin; (3) legs usually dark with narrow pale rings; (4) antennae dark with narrow basal pale rings on flagellomeres 3–10; (5) tarsal claws usually unequal on all legs; and (6) one spermatheca present, without diverticulum. The Nearctic species *A. variegata*, *A. megaparamera* Williams, and *A. needhami* are members of the Maculipennis Group which lack distal spots in the wing cells. *Alluaudomyia variegata* most closely resembles *A. needhami*, but can be easily separated by its distinctive wing markings with infuscation on the membrane between the veins, differences in the shape of the female genital sclerotization, and by the unusual shape of the male parameres. *Alluaudomyia megaparamera* is a smaller species with more reduced wing markings, a yellowish thorax and abdomen, and extensive pale markings on the legs.

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